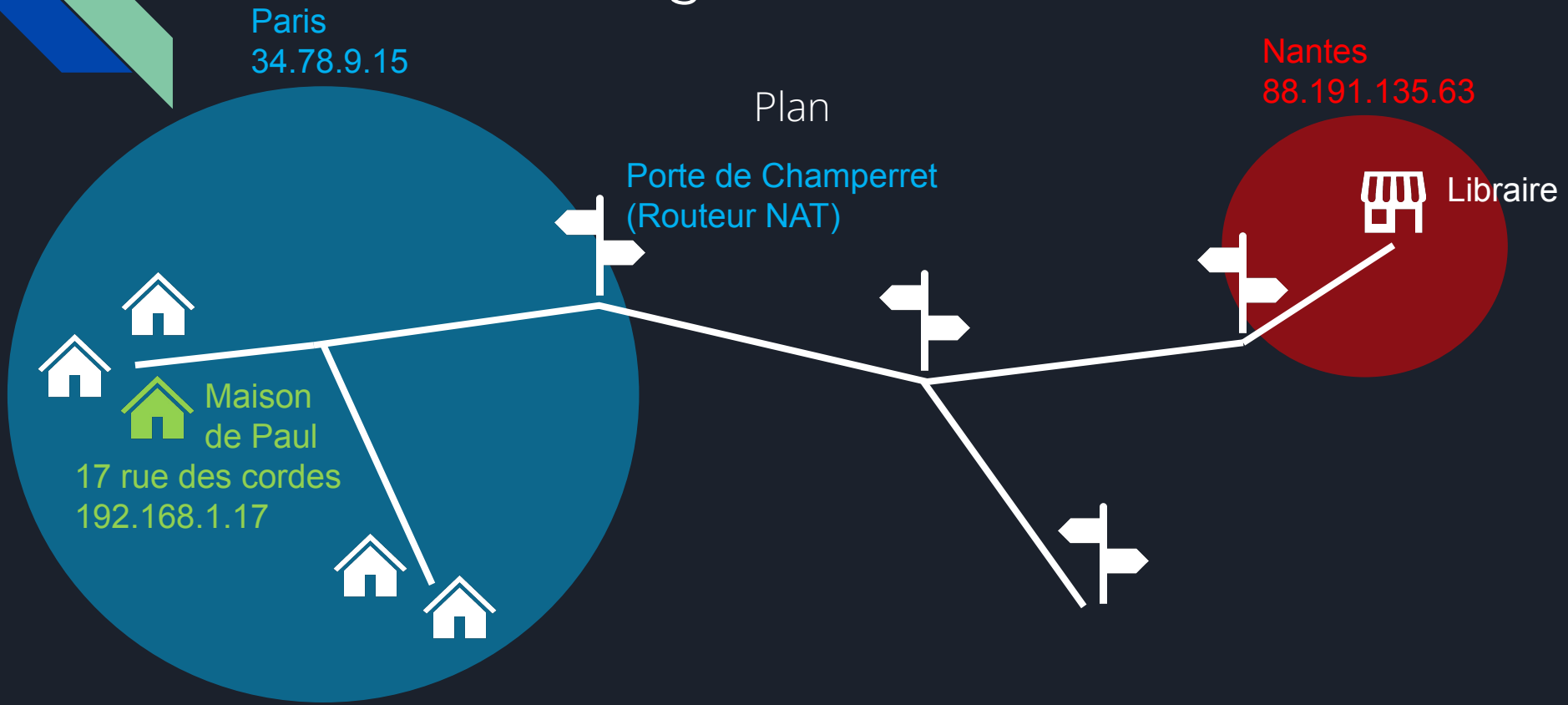
Nouveaux Réseaux - Réseaux Cloud

Un cours d'Amazon Web Services

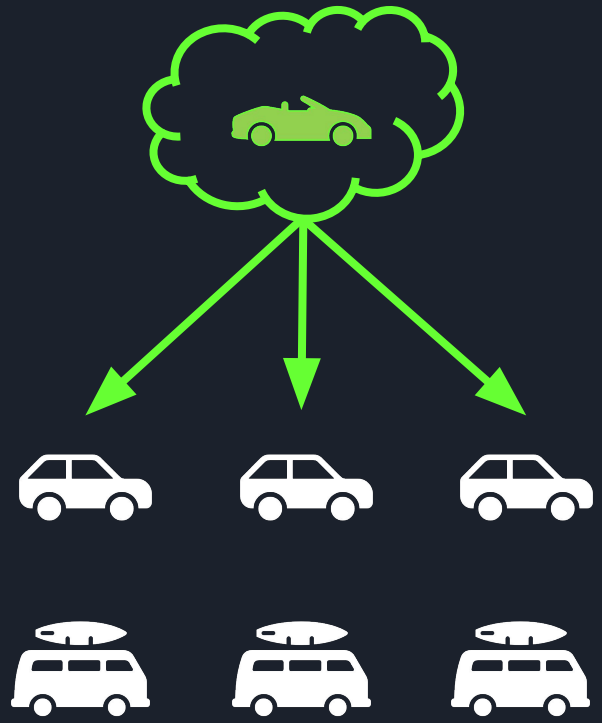
Petit Rappel de cours

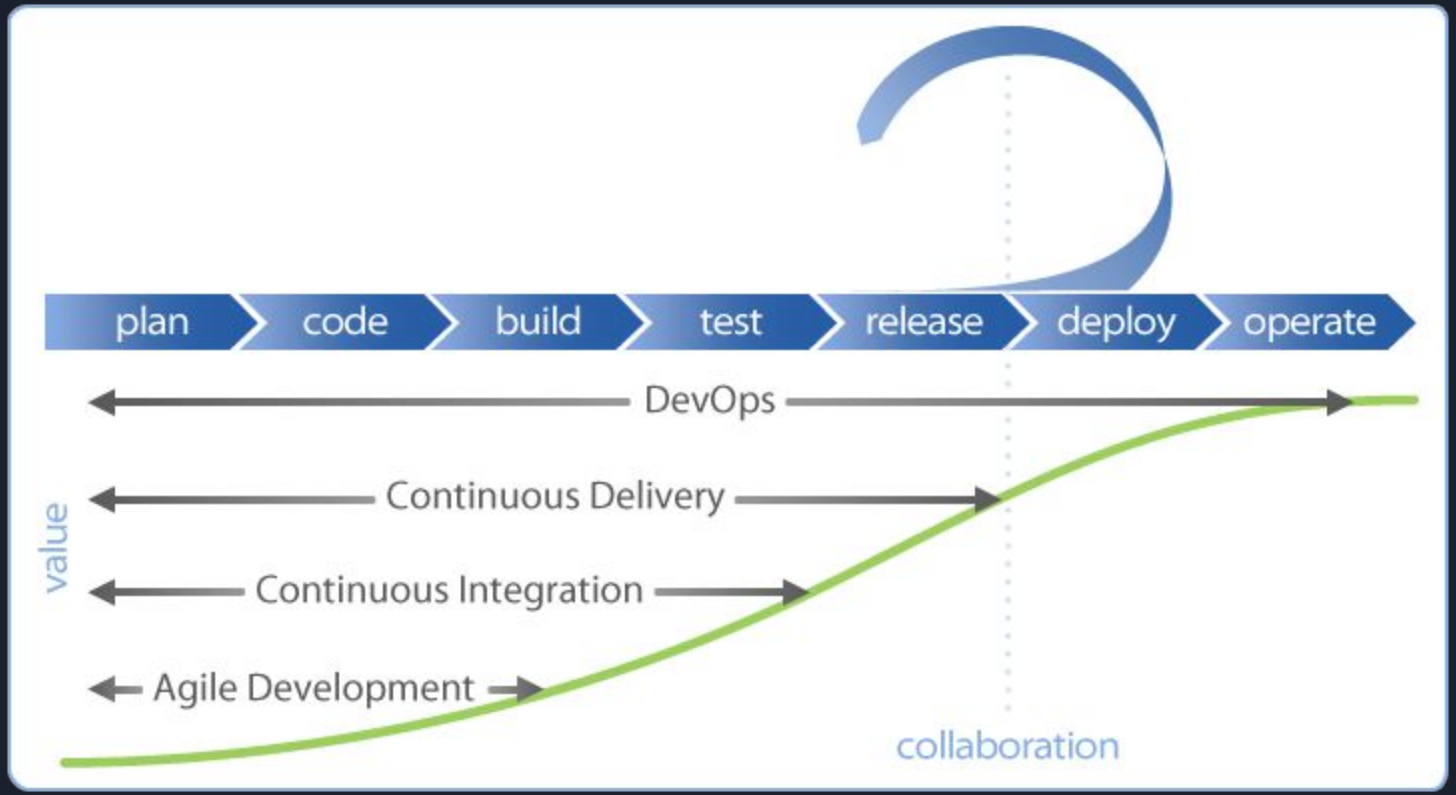
Use case : Le Magazine de Paul



Cloud Manager

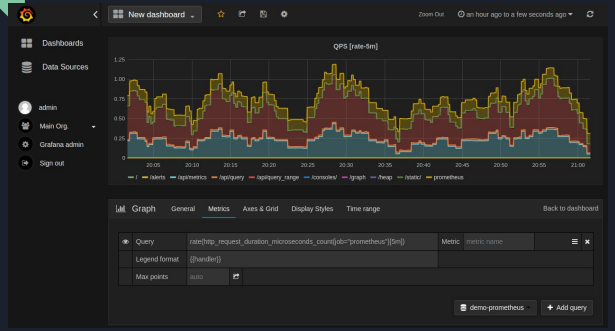
Le **Cloud Manager** est la centralisation des services de gestion de l'infrastructure accessible depuis le Cloud.



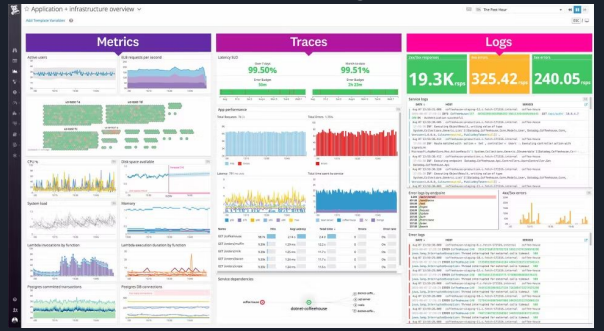

plan
code
build
test
release
deploy
operate
DevOps
Continuous Delivery
Continuous Integration
Agile Development
value
collaboration

Les outils pour du monitoring et log

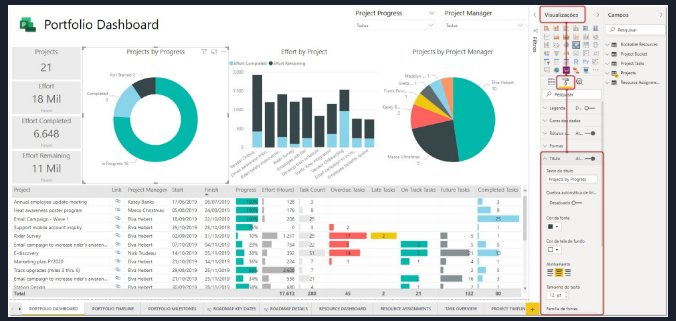
Grafana/Prometheus



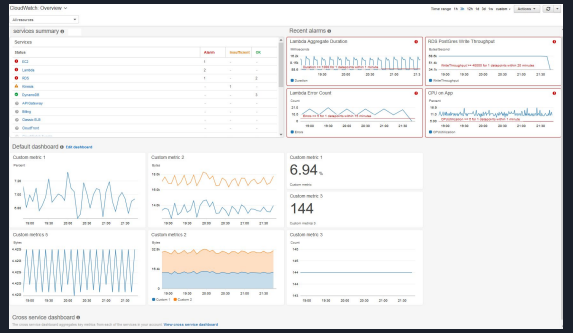
DataDog



PowerBI

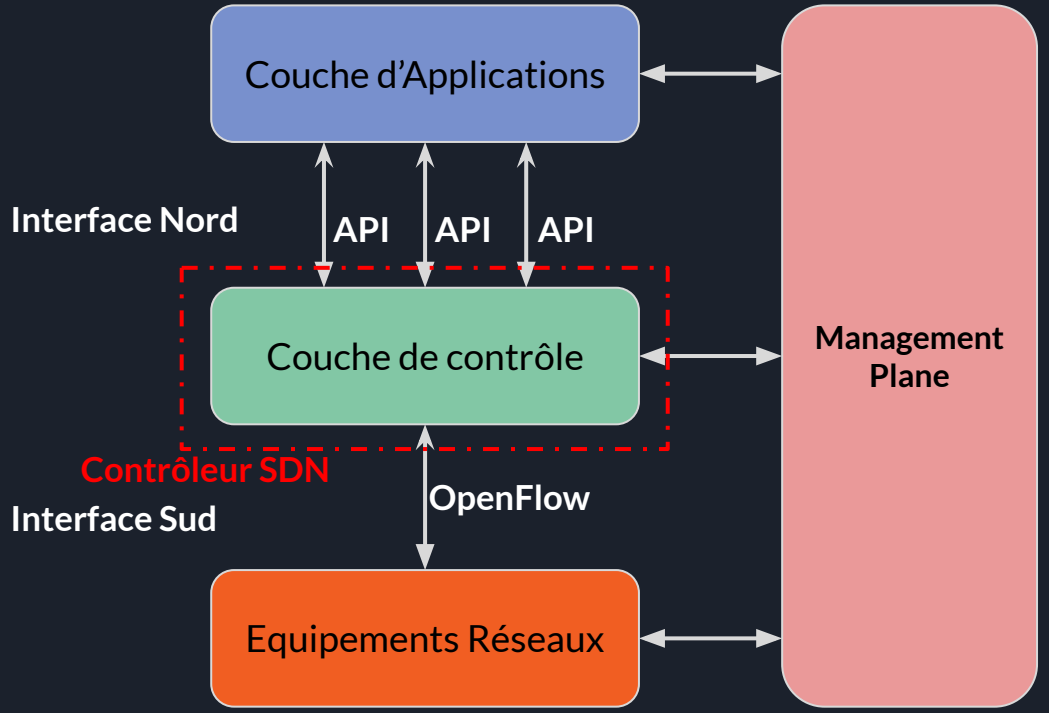


AWS CloudWatch



Le contrôleur SDN

Le contrôleur SDN est le cerveau du réseau, responsable de la logique de contrôle et de la prise de décision. Il communique avec les équipements de réseau via des protocoles comme OpenFlow, et expose des interfaces de programmation pour permettre aux applications de contrôler le comportement du réseau.

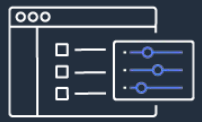


Créer un environnement réseau AWS sur le Cloud

Amazon VPC

Provision a logically isolated section of the AWS Cloud where you can launch AWS resources in a virtual network that you define.

Bring your own network



IP Addresses

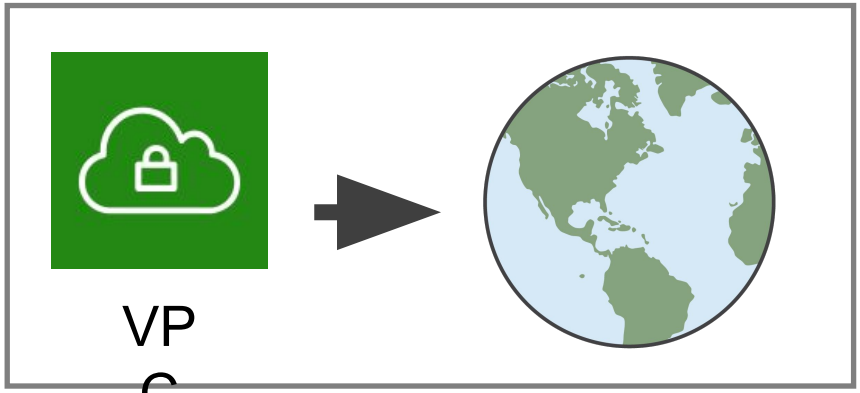
Subnets

Routing rules

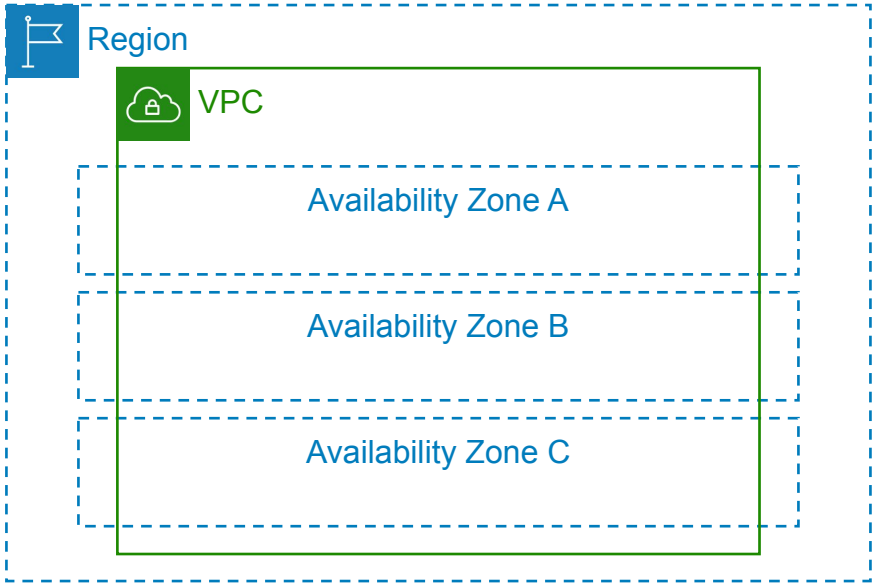
Network configuration

Security rules

VPC deployment



You can deploy a VPC in any AWS Region.



A VPC can host supported resources from any Availability Zone within its Region.

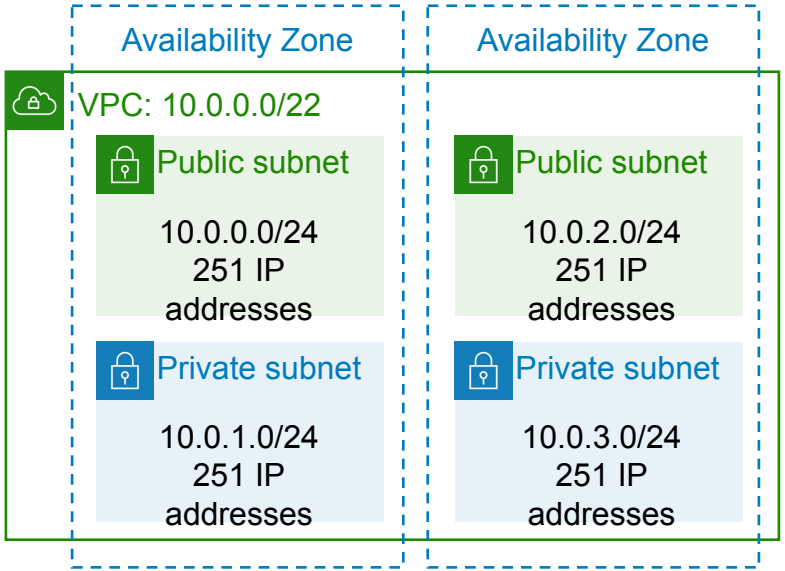
Classless Inter-Domain Routing (CIDR)

0.0.0.0/0	= All IP addresses
10.22.33.44/32	= 10.22.33.44
10.22.33.0/24	= 10.22.33.*
10.22.0.0/16	= 10.22.*.*

CIDR	Total IP addresses
/28	16
…	…
/20	4,096
/19	8,192
/18	16,384
/17	32,768
/16	65,536

Subnets: Dividing your VPC

- A subnet is a segment or partition of a VPC's IP address range where you can allocate a group of resources
- Subnets are not isolation boundaries
- Subnets are a subset of the VPC CIDR block
- Subnet CIDR blocks cannot overlap
- Each subnet resides entirely within one Availability Zone
- You can add one or more subnets in each Availability Zone or in a Local Zone
- AWS reserves five IP addresses in each subnet



Example: A VPC with CIDR /22 includes 1,024 total IP addresses.

VPC design best practices

- Create one subnet per available Availability Zone for each group of hosts that have unique routing requirements.
- Divide your VPC network range evenly across all available Availability Zones in a Region.
- Do not allocate all network addresses at once. Instead, ensure that you reserve some address space for future use.
- Size your VPC CIDR and subnets to support significant growth for the expected workloads.
- Ensure that your VPC network range (CIDR block) does not overlap with your organization's other private network ranges.

Single VPC deployment

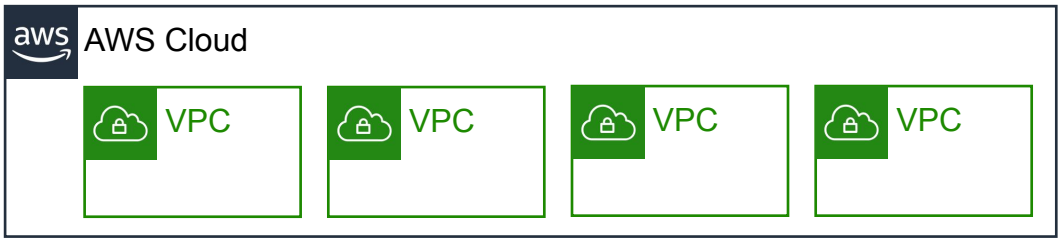
There are limited use cases where deploying one VPC might be appropriate:

- Small, single applications managed by a small team
- High performance computing (HPC)
- Identity management

For most use cases, there are two primary patterns for organizing your infrastructure: multi-VPC and multi-account.

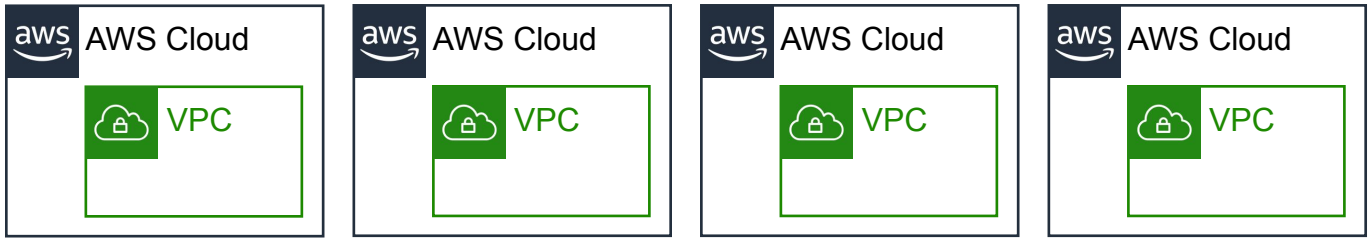
Multiple VPCs

- Best suited for –
  - Single team or single organizations, such as managed service providers
  - Limited teams, which makes it easier to maintain standards and manage access
- Exception –
  - Governance and compliance standards might require greater workload isolation regardless of organizational complexity



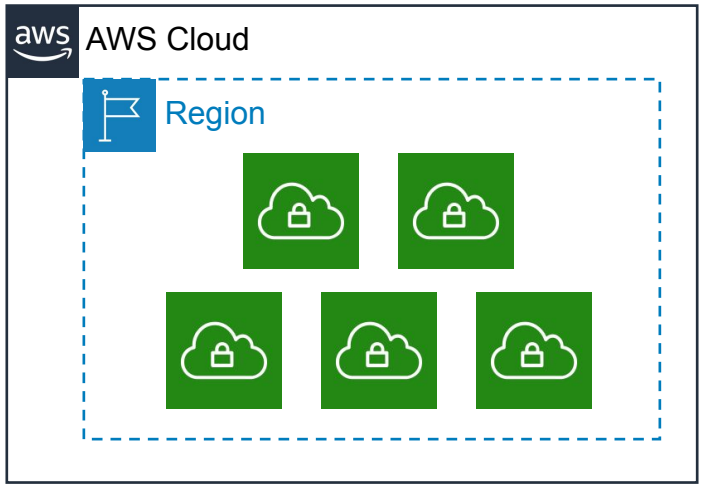
Multiple accounts

- Best suited for –
  - Large organizations and organizations with multiple IT teams
  - Medium-sized organizations that anticipate rapid growth
- Why?
  - It can be more challenging to manage access and standards in more complex organizations



Amazon VPC quotas

Default quota: 5 VPCs per Region per account *



* The default quota is 5 VPCs per Region, but you can request a quota increase.

Key takeaways

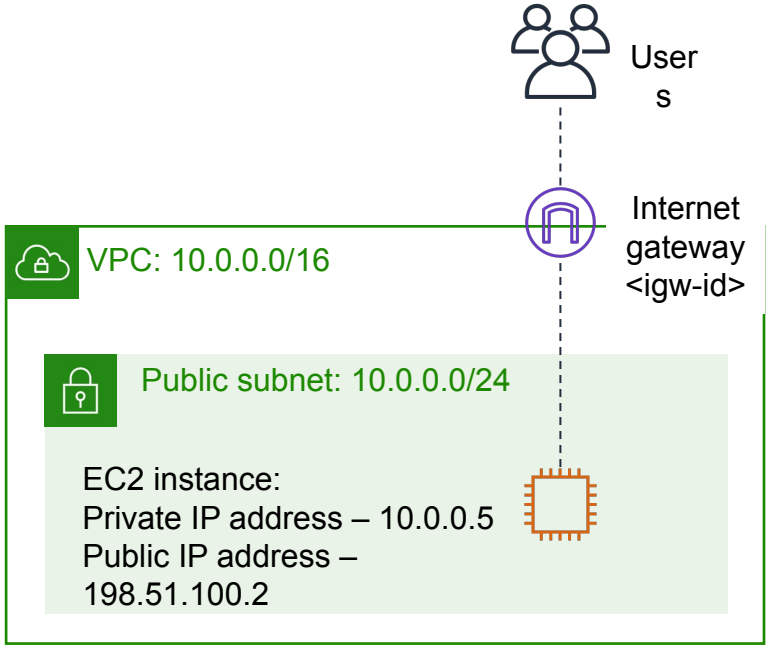
- Amazon VPC enables you to provision VPCs, which are logically isolated sections of the AWS Cloud where you can launch your AWS resources.
- A VPC belongs to only one Region and is divided into subnets.
- A subnet belongs to one Availability Zone or Local Zone. It is a subset of the VPC CIDR block.
- You can create multiple VPCs in the same Region or in different Regions, and in the same account or different accounts.
- Follow best practices when you design your VPC.

Connecter son environnement réseau AWS à Internet

Creating a public subnet

Internet gateways

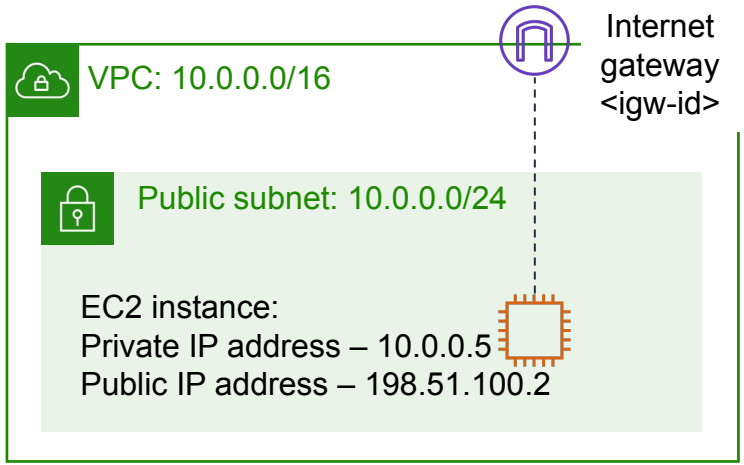
- Allow communication between resources in your VPC and the internet
- Are horizontally scaled, redundant, and highly available by default
- Provide a target in your subnet route tables for internet-routable traffic



Directing traffic between VPC resources

- Route tables are required to direct traffic between VPC resources
- Each VPC has a main (default) route table
- All subnets must be associated with a route table
- You can create custom route tables

Best practice: Use custom route tables for each subnet.



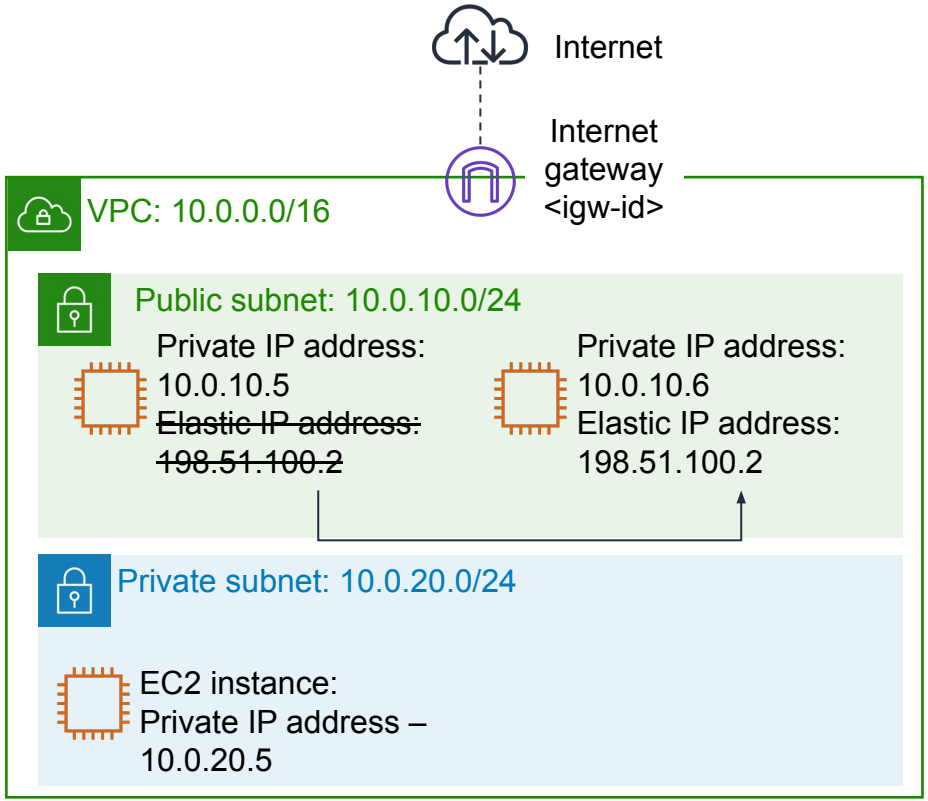
Public route table

Destination	Target
10.0.0.0/16	local
0.0.0.0/0	<igw-id>

Remapping an IP address from one instance to another

Elastic IP addresses

- Are static, public IPv4 addresses associated with your AWS account
- Can be associated with an instance or elastic network interface
- Can be remapped to another instance in your account
- Are useful for redundancy when load balancers are not an option



Connecting private subnets to the internet

NAT gateways

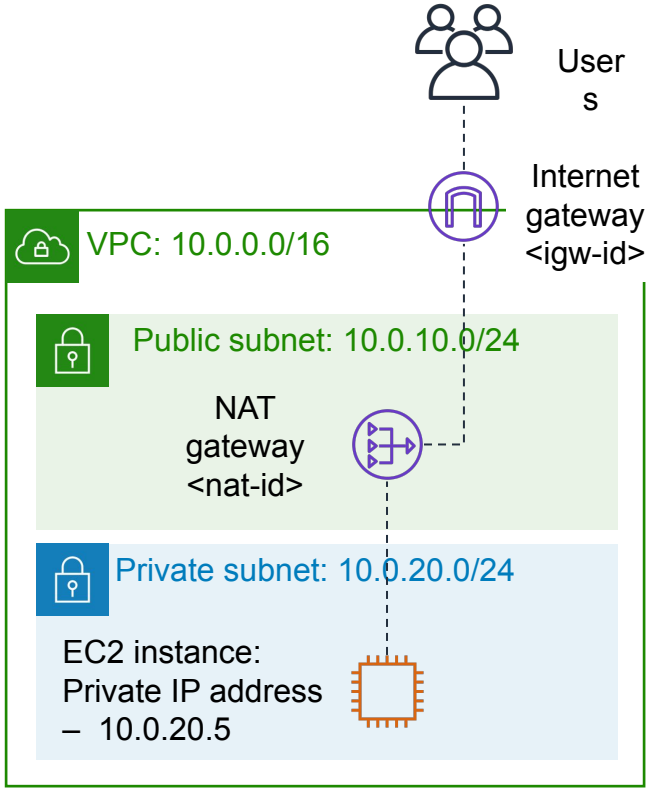
- Enable instances in a private subnet to initiate outbound traffic to the internet or other AWS services
- Prevent private instances from receiving inbound connection requests from the internet

Public route table

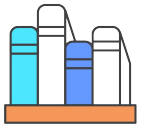
Destination	Target
10.0.0.0/16	local
0.0.0.0/0	<igw-id>

Private route table

Destination	Target
10.0.0.0/16	local
0.0.0.0/0	<nat-id>



Subnet use case examples (1 of 2)



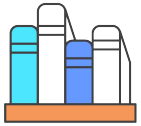
Data store instances

Batch-processing instances

Backend instances

Web application instances

Subnet use case examples (2 of 2)



Data store instances → Private subnet

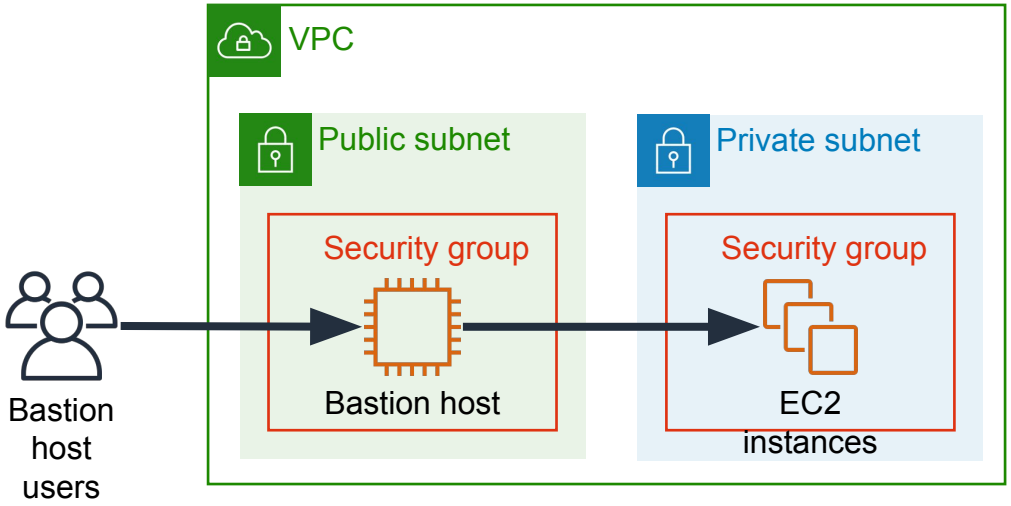
Batch-processing instances → Private subnet

Backend instances → Private subnet

Web application instances → Public or private subnet

Bastion hosts

- A server whose purpose is to provide access to a private network from an external network
- Must minimize the chances of penetration



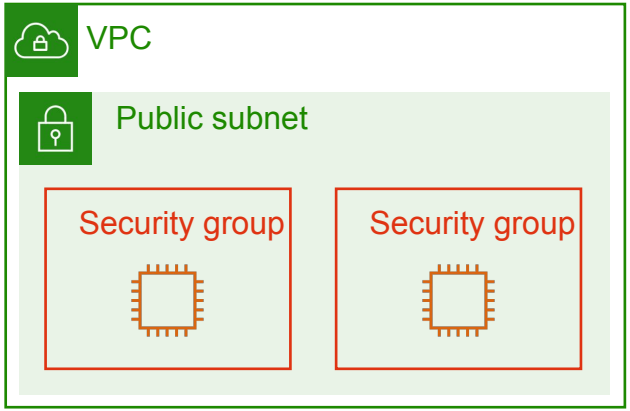
Key takeaways

- An internet gateway allows communication between instances in your VPC and the internet.
- Route tables control traffic from your subnet or gateway.
- Elastic IP addresses are static, public IPv4 addresses that can be associated with an instance or elastic network interface. They can be remapped to another instance in your account.
- NAT gateways enable instances in the private subnet to initiate outbound traffic to the internet or other AWS services.
- A bastion host is a server whose purpose is to provide access to a private network from an external network, such as the internet.

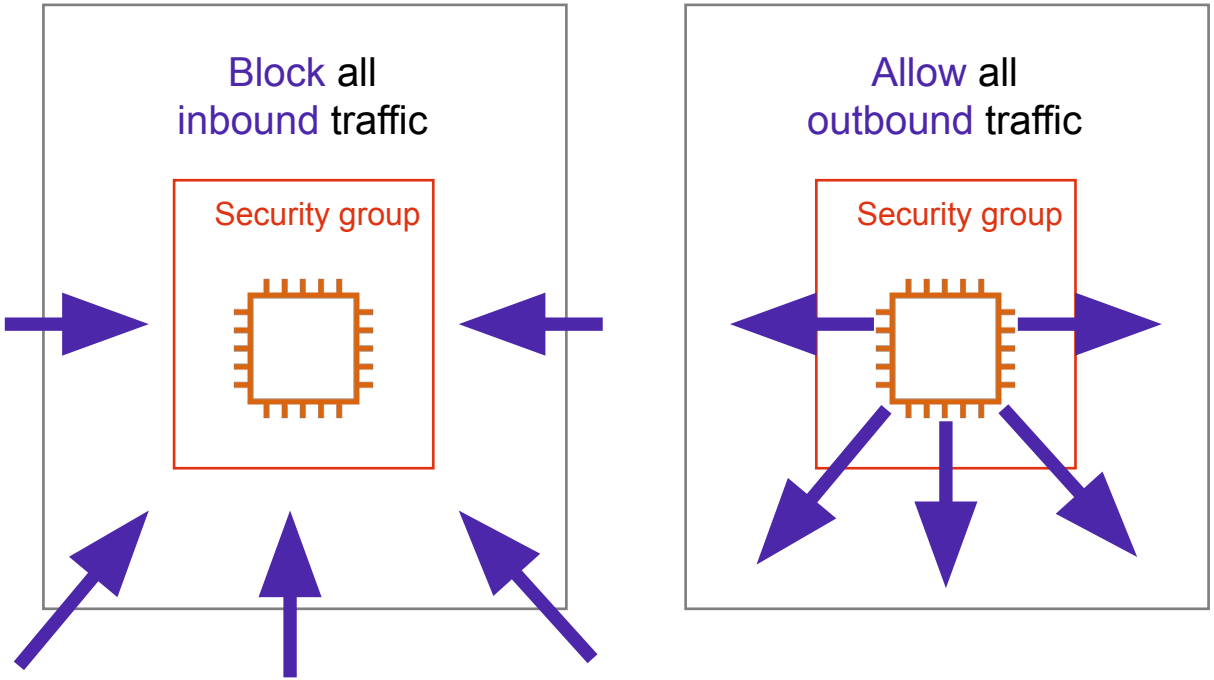
Sécuriser son environnement réseau cloud AWS

Security groups

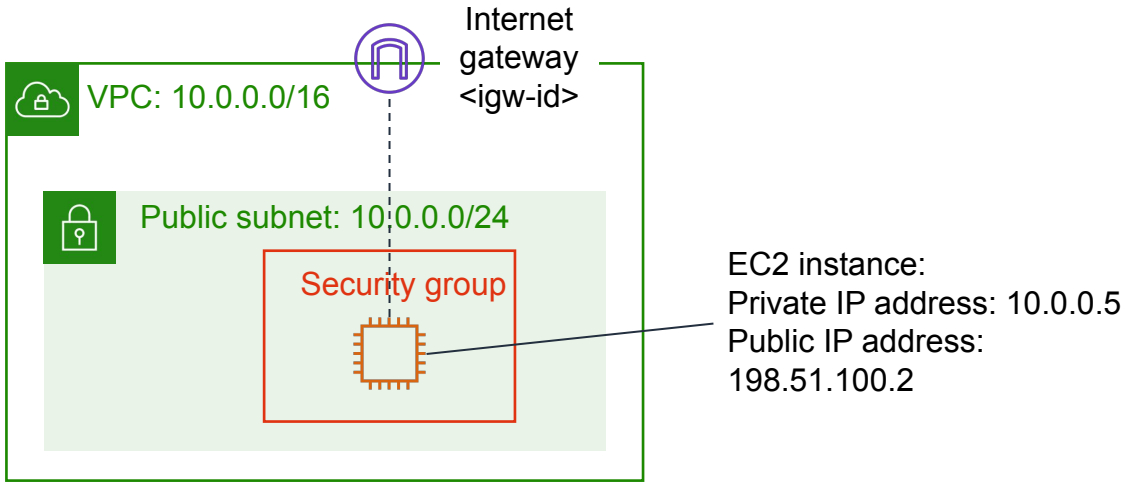
- Are stateful firewalls that control inbound and outbound traffic to AWS resources
- Act at the level of the instance or network interface



Default security groups

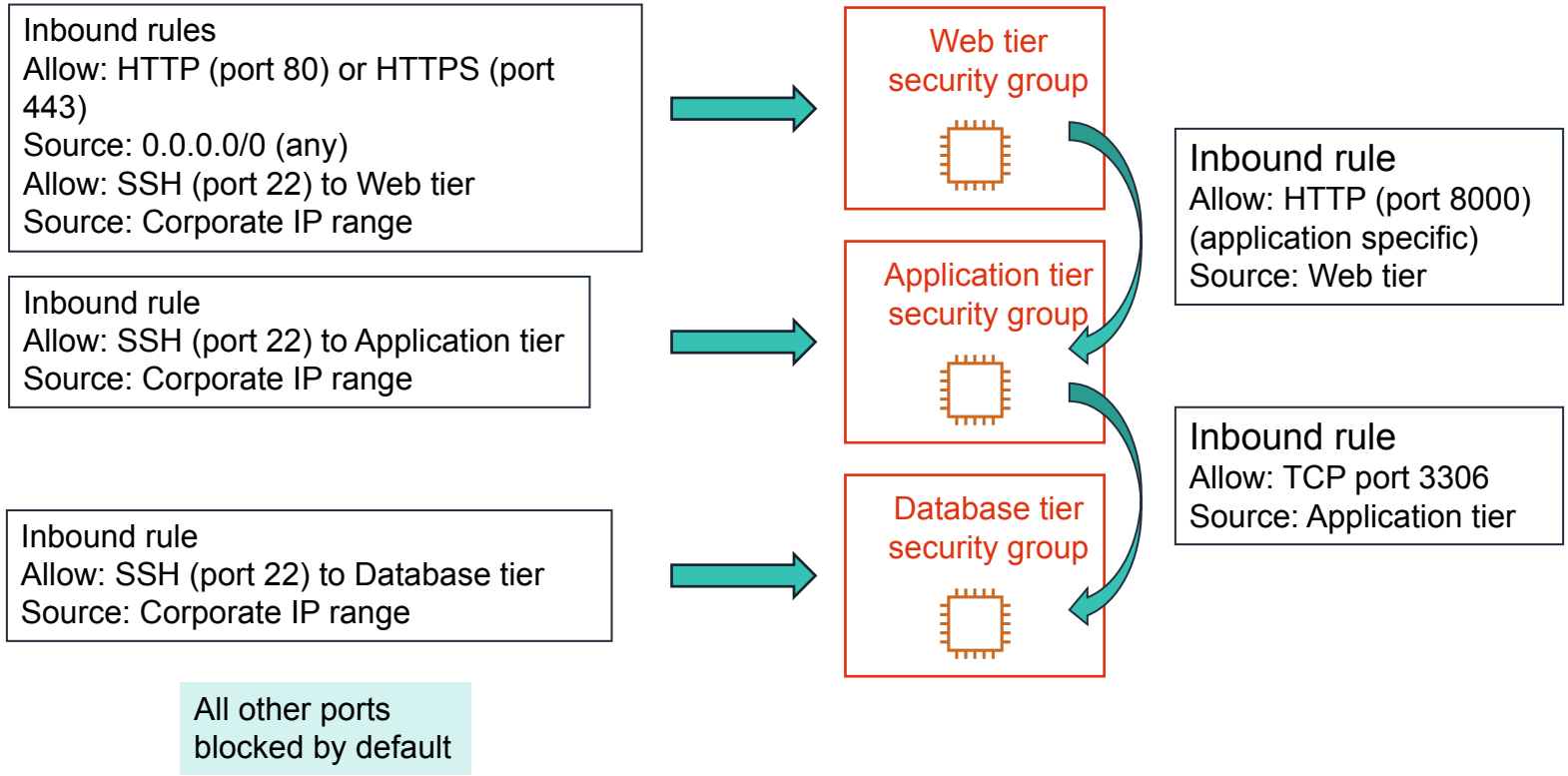


Custom security groups



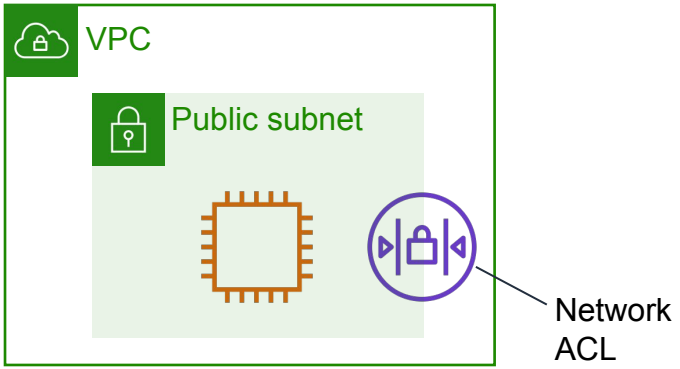
Inbound				
Type	Protocol	Port Range	Source	Destination
HTTP	TCP	80	Anywhere	Allow web access

Chaining security groups



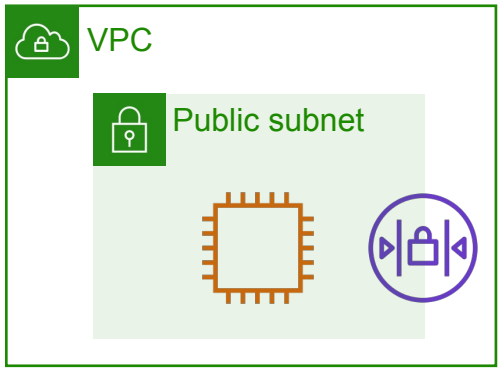
Network access control lists (network ACLs)

- Act at the subnet level
- Allow all inbound and outbound traffic by default
- Are stateless firewalls that require explicit rules for both inbound and outbound traffic



Custom network ACLs

Recommended for
specific network security requirements only

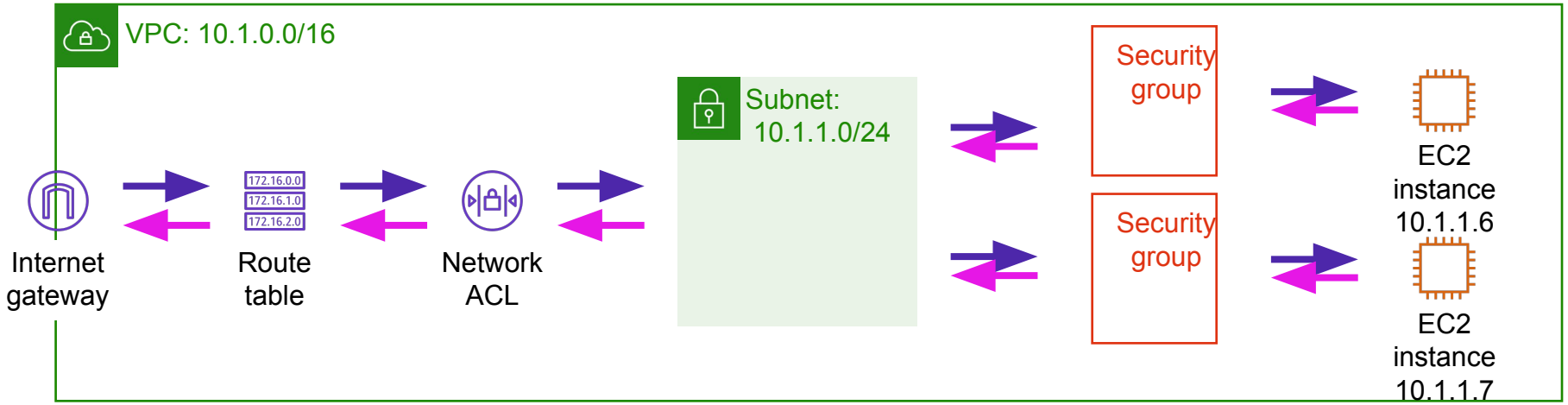


Nacl-11223344

Inbound:
Rules # 100: SSH 172.31.1.2/32 ALLOW
Rules # *: ALL traffic 0.0.0.0/0 DENY

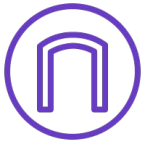
Outbound:
Rules # 100: Custom TCP 172.31.1.2/31 ALLOW
Rules # *: All traffic 0.0.0.0/0 DENY

Structure your infrastructure with multiple layers of defense



Review: How to create a public subnet

To create a public subnet to allow communication between instances in your VPC and the internet, you must:



Attach an internet gateway to your VPC.

Destination	Target
10.0.0.0/16	local
0.0.0.0/0	<igw-id>

Point your instance subnet's route table to the internet gateway.

Make sure that your instances have public IP or Elastic IP addresses.

Security group

Make sure that your security groups and network ACLs allow relevant traffic to flow.

Key takeaways

- Security groups are stateful firewalls that act at the instance level
- Network ACLs are stateless firewalls that act at the subnet level
- When you set inbound and outbound rules to allow traffic to flow from the top tier to the bottom tier of your architecture, you can chain security groups together to isolate a security breach
- You should structure your infrastructure with multiple layers of defense

Module 6 - Guided Lab: Creating a Virtual Private Cloud

Guided lab: Tasks

Use Amazon VPC to manually create a VPC with:

- Public and private subnets
- An internet gateway
- A route table with a route to direct internet-bound traffic to the internet gateway
- A security group for EC2 instances in the public subnet
- An application server to test the VPC

Programme de la semaine prochaine

Exposé sur un sujet

Choisir une technologie réseau novatrice dans le domaine (cloud, quantique, IaC etc…) et développer un exposé autour du sujet permettant de réaliser une veille technologique.

(Usecases attendus, avantages, inconvénients,…)

-

Format : 15 minutes de présentation

Groupes de 3 ou 4 personnes

Envoyer la composition du groupe à l'adresse mail suivante : yann.fornier@gmail.com

Deadline : Dimanche 12 mars à 23h59 (malus de -2 après la deadline)